TECHNICAL NOTE NUMBER 163

UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE

FOREST PRODUCTS LABORATORY

MADISON 5, WISCONSIN REVISED December 1952

DETERMINING PENETRATION OF WOOD PRESERVATIVES

The effectiveness of any wood-preservative treatment is measured very largely by the depth to which the preservative penetrates. This depth can be determined by the following tests, which are used by the Forest Products Laboratory.

The presence of creosote, creosote mixtures, or other dark-colored oils is indicated by the dark discoloration of the wood, and the degree of penetration may readily be determined by taking a sample at a point free from checks and other imperfections and at a considerable distance from the end of the stick. This may be done either by making a hole with an ordinary 1/2-inch bit and measuring the penetration on the wall of the hole, or by using an increment borer to bring out a core of wood that shows in cross section the depth of penetration and is easily examined. The observation should be made at once, because the oil spreads rapidly over the cut surface, particularly over the end grain of the wood. With low-viscosity oils, it is often desirable to examine a tangential or radial section of the treated wood rather than an end-grain section. In order to prevent infection, the hole in the treated piece should be tightly closed with a thoroughly treated plug.

No entirely reliable method has been found for determining the depth of penetration of pentachlorophenol when used in colorless or light-colored oil solvents. In boring cores from wood recently treated, it is often possible to distinguish the "wet" treated portion from the untreated portion of the boring. Some degree of success in determining penetration has been obtained by dusting a mixture of 20 parts of calcium carbonate and 1 part of oil-soluble red dye lightly on freshly cut wood sections before the oil has an opportunity to spread.

Because zinc chloride is colorless, the depth of penetration of this preservative must be ascertained by chemical means. The most common method of determining penetration on a cut face or boring consists in

spraying over the freshly cut surface a mixture of equal parts of a 1 percent solution of potassium ferricyanide, a 1 percent solution of potassium iodide, and a 5 percent solution of soluble starch. This mixture colors the treated portion a very dark blue, but does not affect the untreated wood. Although the color fades in time, it may be brought back by spraying again. This method may also be used to determine penetration of chromated zinc chloride.

Sodium fluoride is colorless, but its presence in wood can be determined by the following method. Make one solution (1) in the ratio of 5 grams of zirconium oxychloride in 500 cubic centimeters of water. Make another solution (2) in the ratio of 2 grams of sodium alizarine sulfonate, 40 cubic centimeters of concentrated hydrochloric acid, and 460 cubic centimeters of water. The two solutions are kept separated until ready for use, when a quantity of solution 2 is added to an equal quantity of solution 1. It is essential that solution 2 be added to solution 1 rather than vice versa. The cut surfaces or borings are sprayed or dipped in the mixed solution. The treated wood will turn yellow, and the untreated wood will become dark red. This method is also recommended by the proprietors of some patented fluoride-phenol-dichromate preservatives to measure the penetration of the sodium fluoride.

Mercuric chloride is also colorless, but dipping the wood in a solution of hydrogen sulfide turns the treated area black.

The penetration of preservatives containing copper salts, such as Greensalt (Erdalith or Ascu), Celcure, and Chemonite, can usually be observed without the aid of a special stain. The following stain is useful, however, for determining the penetration of these preservatives: Dissolve 0.5 gram of 5-diphenyl carbazide in 50 cubic centimeters of isopropyl alcohol and 50 cubic centimeters of water. When a boring or cross section of treated wood is sprayed or dipped in this solution, the presence of the copper compound is indicated by a purple color, and the untreated wood shows little change.

As individual pieces may show an abnormally high or low degree of penetration, a sufficient number of tests should be made to obtain a fair average. Samples should be taken at a considerable distance from the ends of the stick, in order that they will not be affected by the heavy longitudinal penetration from the ends.

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